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GAVIN NEWSOM
Governor

Dear Health Care Delivery Leaders and County Health Entities,

We started planning for the pandemic that we are facing today over a decade ago. While we hoped that it would never happen, those plans and our deep partnerships across the state have allowed us to move expeditiously into a strong position of readiness for the potential surge COVID-19 could impose on our care delivery system.

As a continuum of that planning, including for the worst-case scenario, the California Department of Public Health shares with you here the California State SARS-CoV-2 Crisis Care Guidelines. California is one of a number of states with such guidance. Anchored in best practices from across the country, and guided by ethical principles and a commitment to equity, it provides a framework to help health care facilities and county health departments plan for the potential of a COVID-19 surge that is overwhelming. It aims to ensure that, should conditions push our systems into providing crisis care, we do so in a coordinated and thoughtful manner, using a common framework, procedures, and decision making that best protects the health of all Californians.

The shift to delivering crisis care happens at the extreme. During normal times, customary routine services are provided through standard operating procedures. As resources become constrained, from facilities to supplies to staffing, systems shift from conventional care into contingency care. Crisis care falls at the far end of the spectrum, when resources are scarce and the focus shifts from providing the best care for the individual patient to delivering the best care for the patient population.

This document addresses common categories of health care delivery, triage, staff and space that could arise when available resources are limited or insufficient to meet the medical needs of patients. It provides an overview of surge capacity and crisis care operational considerations for health care facilities with an emphasis on hospitals for the state of California. It provides information to support regional or county health entities, including health departments as well as individual health care facility operations, but it does not alter or diminish health care facilities' and systems' responsibilities during catastrophic public health events. It does not replace the judgment of the regional health care facilities' operational management, medical directors, their legal advisors or clinical staff and consideration of other relevant variables and options during an event.



As your State Public Health Officer, the gravity of what is contained within this document is felt deeply. The conversations that will be prompted by its release will be difficult. As professionals and leaders responsible for protecting the wellbeing of our state's 40 million plus residents, I am confident that the common ground provided by these guidelines will provide the transparency, mutual understanding and trust we will all need to get through the most trying of times, should they arrive.

With respect and honor to serve with you,

A handwritten signature in blue ink, appearing to read 'Sonia Y. Angell', written in a cursive style.

Sonia Y. Angell, MD, MPH
State Public Health Officer & Director

California SARS-CoV-2 Pandemic: Health Care Surge Crisis Care Guidelines

CONCEPT OF OPERATIONS

April 2020

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DISCLAIMER

The information contained in this document is meant to provide useful information to health care facilities and systems, but does not in any way alter or diminish health care facilities' and systems' responsibilities during catastrophic public health events. Health care facilities or systems implementing these strategies in crisis situations should assure communication and coordination with their Health Care Coalition (HCC) partners, their Medical and Health Operational Area Coordinator (MHOAC), Regional Disaster Medical and Health Specialist (RDMHS), the California Department of Public Health (CDPH), Emergency Medical System Authority (EMSA), and public safety partners to assure the invocation of appropriate legal and regulatory protections as appropriate in accord with state and federal laws. Recommendations within this document may be superseded by incident specific recommendations by CDPH. Web links and resources listed are provided as examples and their listing does not imply endorsement by CDPH.

Introduction

This document is a framework designed to help health care facilities plan for the COVID-19 pandemic, which may cause overwhelming medical surge. This guidance assumes incident management and incident command practices are implemented and key personnel are familiar with healthcare emergency management planning and processes that underlie scarce resource decision-making.

During a catastrophic public health event that results in medical surge, each health care facility or health care system will use this guidance as a framework to determine the most appropriate steps and actions for their entity based on their environment, hazards, and resources. Since pre-planned actions are always preferred to impromptu decisions, pre-event emergency management planning and training is recommended. This document addresses common categories of health care delivery, triage, staff and space that could arise when available resources are limited or insufficient to meet the medical needs of patients. In California, local or regional Healthcare Coalitions (HCCs), hospitals and health care systems may determine additional issues and strategies in addition to those outlined in this document.

This document provides an overview of surge capacity and crisis care operational considerations for health care facilities with an emphasis on hospitals for the state of California. In addition to this framework, hospitals and health care systems are encouraged to review federal guidance which can be found on the National Academies of Science webpage.

This document is meant to provide information to support regional or county health entities, including health departments as well as individual health care facility operations, as they develop and implement their operational plans. It is the responsibility of the regional entity or the facility to work with their management team and medical staff to ensure operational plans are in place. This document does not replace the judgment of the regional health care facilities' operational management, medical directors, their legal advisors or clinical staff and consideration of other relevant variables and options during an event.

States and national medical organizations have shared best practices and incorporated relevant medical literature in developing Crisis Care guidelines. California is using this collaborative work as a cornerstone for these guidelines.

Care Continuum

Most health care facilities are familiar with the concepts of surge capacity, the ability to manage a sudden influx of patients¹ and surge capability, the ability to manage patients requiring very specialized medical care.² During conventional care, customary routine services are provided through standard operating procedures. During contingency care, care provided is functionally equivalent to routine care but equipment, medications, and even staff may be used for a different purpose or in a different manner than typical daily use (e.g. substituting one antibiotic for another that covers the same classification). The demands of most incidents can be met with conventional and contingency care. Crisis care falls at the far end of the spectrum when resources are scarce and the focus changes from delivering individual patient care to delivering the best care for the patient population.

The goal during a medical surge event is to maximize surge capacity strategies that mitigate the crisis while minimizing the risks associated with deviations from conventional care. Choosing the strategies that are most appropriate to the situation and pose the least risk to the patient and provider first, and then proceeding to riskier strategies as demand increases and options decrease, is the preferred path.

Surge capacity is described across a spectrum of three categories (Figure 1):

- **Conventional:** Usual resources and level of care provided.³ For example, during a surge in patients, maximizing bed occupancy and calling in additional staff to assist.
- **Contingency:** Provision of functionally equivalent care that may incur a small risk to patients. Care provided is adapted from usual practices. For example, boarding critical care patients in post-anesthesia care areas using less traditional, but appropriate resources.⁴
- **Crisis:** Disaster strategies used when demand forces choices that pose a significant risk to patients but is the best that can be offered under the circumstances. For example, cot-based care, severe staffing restrictions, or restrictions on use of certain medications or other resources.⁵

¹ ASPR. 2017-2022 Health Care Preparedness and Response Capabilities. pg. 44

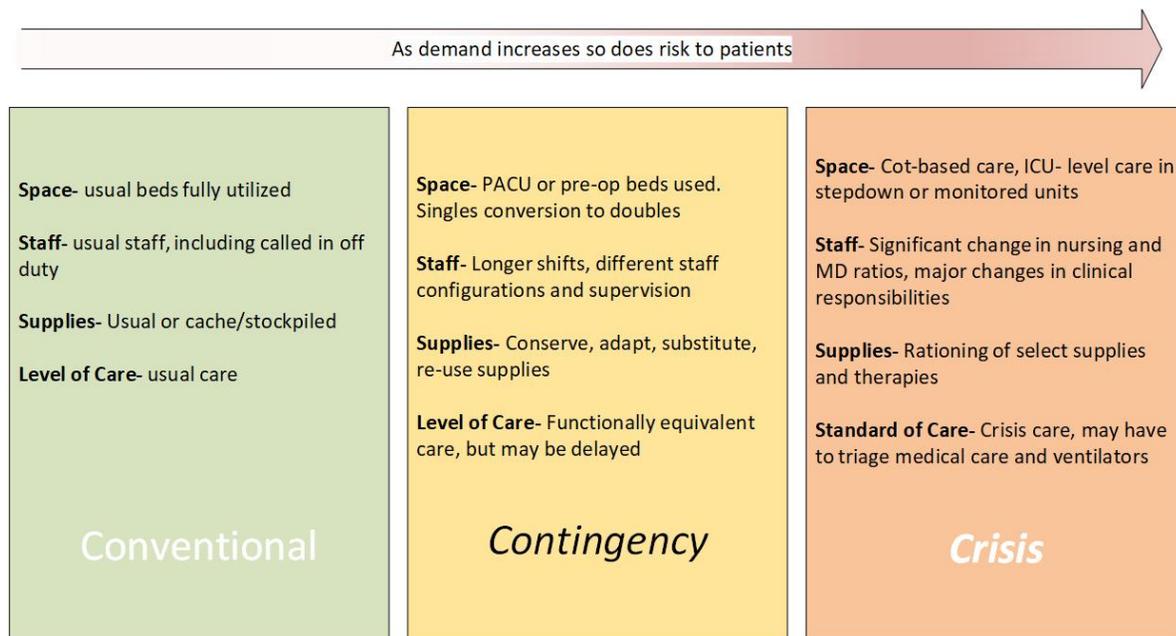
² ASPR. 2017-2022 Health Care Preparedness and Response Capabilities. pg. 44

³ Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine*, 59(3), p 178.

⁴ Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine*, 59(3), p 178.

⁵ Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine*, 59(3), p 178.

Figure 1: Examples of Changes in Health Delivery (modified from IOM)



Key Points about Crisis Care

- Crisis care is not a separate triage plan. These strategies are extensions of surge capacity plans.
- Crisis care may occur during long-term events such as pandemics when resource constraints are likely to persist for long periods of time, or during short-term, no-notice events where help will arrive, but too late to solve an acute resource shortfall.
- Health care facilities will not have an option to defer caring for patients in a crisis. Demand, guided by ethics, will drive the choices that have to be made.
- If strategies are not planned for ahead of time, they might not be considered and/or will be difficult to implement.
- Strategies should be proportional to the resources available. As more resources arrive, you should move back toward strategies that are less demand driven (and therefore, back toward contingency and eventually conventional status).

The principles of crisis care must be integrated into Emergency Operations Plans (EOPs) at all levels of health care.

Roles and Responsibilities

The primary focus of this guidance is on the operational strategies for health care facilities during crisis. Health care facilities should be supported by regional Healthcare Coalitions (HCCs), their Medical and Health Operational Area Coordinator (MHOAC), Regional Disaster Medical and Health Specialist (RDMHS), CDPH, Emergency Medical System Authority (EMSA), and public safety partners, local EMSA, and state and local government agencies.

HCCs includes partnerships between local public health, EMS, health care facilities, and emergency management that provide planning and response coordination.

Planning and Implementation

Indicators and Triggers

An indicator is a “measurement or predictor of change in demand for health care services or availability of resources.”⁶ An example of an indicator is a report of several confirmed cases of COVID-19 in the community by the local health department. A trigger is a “decision point about adaptations to health care service delivery” that requires specific action.⁷ An indicator may identify the need to transition to contingency or crisis care (but requires analysis to determine appropriate actions), while a trigger event dictates action is needed to adapt health care delivery and resources. It is important for organizations to identify indicators and triggers prior to an event due to the “stress, complexity, and uncertainty inherent in a crisis situation.”⁸

There are two types of triggers – scripted and non-scripted. Build scripted triggers into standard operating procedures, which are automatic ‘if/then’ decisions. Whenever possible, scripted triggers should be developed for frontline personnel (point of entry health care facility staff, reception, etc.) so they have actions they can take immediately to prevent delay. An example may be isolation protocols for individuals showing certain signs or symptoms of a particular disease.

Non-scripted triggers require additional analysis involving supervisory staff. These are often part of an incident action planning cycle. The less specific the information available, the more difficult it is to apply a scripted trigger and the more likely an experienced supervisor or subject matter expert will be involved to process the information and decide on necessary actions. Frontline personnel should have a low threshold for passing indicator information along to supervisors for situational awareness and potential decision-making.

In addition to identifying response specific indicators and triggers, hospitals should determine the trigger or threshold to identify when they are in crisis care whenever possible. For example, if a hospital is providing cot-based care or any intensive care unit (ICU) care is provided outside

⁶ Dan Hanfling, John Hick, and Clare Stroud, Editors; Committee on Crisis Standards of Care: A Toolkit for indicators and Triggers; Board on Health Sciences Policy; Institute of Medicine, “Crisis Standards of Care: A Toolkit for Indicators and Triggers” (the National Academies Press, 2013) 2

⁷ Ibid

⁸ Ibid

usual intermediate and pre/post op areas, these are indicators that operations are now into crisis care and should trigger a response action. These triggers will vary by facility depending on size and resources. Facility level indicators and triggers should be communicated with health care coalition partners, MHOACs and RDMHSSs.

Detailed information on indicators and triggers (including templates for health care facilities) is available in the [2013 IOM/NAM Crisis Standards of Care: A Toolkit for Indicators and Triggers](#).

How to identify and incorporate Indicators and Triggers in your EOP

1. Do not focus on indicators and triggers in isolation.
2. Determine what response strategies or options you may use during a disaster.
3. Determine what indicators might be available during a disaster that would trigger hospital action.
4. Identify trigger points for your health care facility including, but not limited to:
 - a. Implementing triage
 - b. Temporarily closing your facility to new admissions or transfers
 - c. Canceling elective procedures
 - d. Stockpiling or ordering more supplies
 - e. Implementing staffing changes
5. Determine what staff actions should happen based on the indicator. These should be specific and tell staff exactly *when* they should take certain actions. This is critical to the success of the response.

Having specific actions staff should take at a clearly defined trigger is critical to the success of the response. Delays in decision-making occur in unfamiliar situations and with unclear authority.

Supply Management

Healthcare facilities are expected to anticipate supply needs and make every effort to procure in advance supplies through usual supply chains and standing vendor contracts. In addition, coordination with healthcare coalition partners and local reserves may provide a source of supplies otherwise in shortage.

When usual supply chain sources are exhausted, supply resource requests can be made through the local Medical Health Operational Area Coordinator (MHOAC), who in turn will attempt to fill these requests through regional and state level stores of supplies and various procurement capability.

Core Strategies

Six core strategies can be employed in anticipation of a shortage of space, supplies, and/or staff. These strategies can help avoid or mitigate a crisis of care situation. When writing an EOP consider how your facility will utilize these strategies:

- **Prepare:** pre-event actions taken to minimize resource scarcity (e.g. stockpiling of PPE, medications or supplies, planning, training).
- **Substitute:** use an equivalent device, drug, or personnel for one that would usually be available (e.g. exchanging morphine for fentanyl).
- **Adapt:** use a device, drug, or personnel that are not equivalent but that will provide sufficient care (e.g. anesthesia machine for mechanical ventilation; LPN with RN supervision instead of multiple RNs).
- **Conserve:** use less of a resource by lowering dosage or changing utilization practices (e.g. minimizing use of oxygen driven nebulizers to conserve oxygen).
- **Re-use:** re-use (after appropriate disinfection/sterilization) items that would normally be single-use items.
- **Re-allocate:** restrict or prioritize use of resources to those patients with a better prognosis or greater need.

Acute Care Hospitals

1. Review available resources and determine potential strategies to address Crisis Care Guidelines across the surge capacity continuum from conventional to crisis care.
2. Review your hospital's capabilities in managing surge, critical care, infectious disease, isolation, just-in-time training, and pediatrics to meet their objectives.
 - a. Involve in this review: nursing, administration, emergency management, emergency services, ancillary and support services—lab, radiology, respiratory therapy, pharmacy, facilities etc.—and physician personnel.
 - b. Include critical care if your institution provides those specialties.
3. Determine what number of pandemic patients will be planned for based on suspected hazards. Consider your role in the community and the presence or absence of other health care facilities in the area.
4. Incorporate indicators and triggers (surge capacity information throughout the care continuum) into your EOP.
 - a. This should also include the notifications to supervisors and partner agencies that need to occur when these triggers are activated. Delegating authority to activate the disaster plan to ED staff or nursing supervisors/charge nurses should be done when possible to facilitate rapid action. The adoption of clear policies helps facilitate decisions as well as provides accountability.

5. Education and training of staff should be conducted to assure successful implementation of the plan.
 - a. Keep in mind the training practice of educating to an awareness, knowledge, and proficiency level. Not all staff members need to be proficient in the plan, but those frontline decision-makers (charge nurses, unit supervisors etc.) should know how to incorporate surge capacity into their respective units prior to an incident. See below for more detail on Health Care Worker Engagement.
 - b. Job aids—such as brief task cards or job action sheets—should be widely used to help frontline personnel with initial decisions and actions.
6. During an event response, the facility should review and modify their procedures as needed as part of the incident action planning process. Plans should be adaptable and not “lock in” disaster response protocols for the duration of an incident but allow flexibility and transition toward conventional care as more resources arrive or demand falls, or both.
7. Exercising the plan is an important part of training and testing your plan. It is important when testing any EOP that you really push the exercise into the crisis care mode.
8. Review and updates to the plan should occur when new information is available.

Non-Acute Care Facilities and Services

The role of non-acute care facilities, such as ambulatory care centers, clinics, hospices, home care, skilled nursing facilities, alternative care facilities, etc. is different than that of acute care hospitals during a pandemic. These facilities can provide critical capacity, both outpatient and post-acute care, and may be needed to broaden their scope of care during such incidents.

1. Examine your resources and determine potential contingencies such as:
 - a. Extended hours
 - b. Conversion of space and staff from specialty care to primary care duties
 - c. Changes to charting and administration to enhance work flow (template charts and prescriptions for the event)
 - d. Changes to scheduling (e.g. cancel or re-schedule elective procedures and appointments)
 - e. Enhanced use of tele-medicine, telephone prescribing, and e-visits to manage workload
 - f. Adjust clinic flow to avoid exposing well persons to ill persons
 - g. Communicate and implement guidance on scarce resources (e.g. guidelines for prescribing anti-viral medications or administering vaccine)

- h. Increase your normal acuity of patients to support acute care hospitals
 - i. Consider the utilization of volunteers to provide check-in and other services
2. The applicable activities to your agency or facility should be incorporated into your EOP.
3. Education and training of staff should be conducted to assure successful implementation of the plan. See below for more detail on Health Care Worker Engagement.
4. Exercising the plan is an important part of training and testing your plan. It is important when testing any EOP that you really push the exercise into the crisis care mode.
5. Coordination with the partners within your health care coalition to promote consistency and coordination of care is necessary.

Health Care Staff Engagement

Given the high risk of moral distress in pandemic situations, it is important for staff to understand the goal of crisis care, the ethical principles underlying triage decisions, and the specific plans of the institution. However, not all staff need to know every plan word for word. Staff should be divided into tiers for education— knowledge, competency, and proficiency.

- **Knowledge:** awareness of the plan; A floor nurse should understand how the surge plans affect their unit, including use of cots and changes in staffing, but does not need to know details of the plan (e.g. how to activate the plan).
- **Competency:** the ability to do something successfully or efficiently in relationship to the plan; A nursing supervisor should understand when to activate the plans, and who to notify. Frontline clinical staff should know which criteria may be ethically considered when making triage decisions.
- **Proficiency:** a high degree of competence or expertise; Staff who are fulfilling incident command roles should understand the facility operations and how to interface with your HCC, where to get help or expertise, and be prepared to adopt proactive crisis care strategies with input from subject matter experts. In general, all health care facilities should have three-deep personnel for each HICS position.

Exercises

Health care facilities should elevate their exercises into a true crisis mode. Often, we are good at testing our plans at a contingency level, but have trouble testing them on a crisis level. At minimum, health care facilities should provide tabletop and other exercise opportunities—like workshops—to walk through the processes outlined in the EOP for crisis standards of care.

For example, having clinical staff walk through how they would increase their surge capacity in the ICU with space, staff, and supplies will allow them to become more comfortable with their roles and responsibilities relative to crisis care and will help drive modifications of existing plans. This will also help clinical staff and administrators recognize triggers and have them become second nature to them, thus preventing hesitation during a real event.

Exercises should also test how your team would interface with your health system partners to emphasize that under no circumstances should a health care facility be providing crisis care in a silo without reaching out for assistance from partners.

Integration with Local or Regional Health System Partners

It is critical that health care facilities **do not** work on surge and crisis care plans in isolation, but in concert with their local and regional partners, public health, the Medical Health Operational Area Coordinator (MHOAC) and with their parent health systems, as applicable.

Consistency of plans and knowing what other health care facilities in the region are planning is critical to success. Surge strategies and standard procedures do not have to be identical, but if they are similar, it will help greatly in education, training, and mutual aid response. Health care coalitions help coordinate not only planning, but also response activities among partner health care facilities, public health, EMS, and emergency management. During a response, public health and the MHOAC provide situational awareness through information sharing, manage and coordinate resource requests, and facilitate or engage in response coordination role for the delivery of health care services. They may also convene workgroups during planning or a response to help develop regional tactics (e.g. to support alternate care sites or processes during a response or develop common policies such use and conservation of N95 masks). Public Health and the MHOACs will also engage with neighboring MHOACs, Regional Disaster Medical Health Coordinators (RDMHCs) and state agencies to coordinate information and strategies. This coordination assists in maintaining a common operating picture.

The key is to only implement crisis strategies when assistance from regional and state partners is inadequate (either too little or too late) and no “bridging” therapies or patient transfers can address the need.

Assuring regional coordination and leveraging available resources prevents inappropriate transition to crisis standards of care. Coordination with the regional partners *must* be achieved as soon as possible when a crisis develops so patient care can return to conventional operations as soon as possible. The sooner a crisis is recognized (indicators) and pre-planned resources and coordinating mechanisms are activated (triggers), the shorter the crisis period will be.

Having a good surge capacity plan contributes to the goal of emergency planning to avoid Crisis care situations.

Response

All emergencies are addressed at the local level. If the emergency exceeds capacity at the local level, response entities will go to the State and when State capacity and resources are reached the federal government will become involved. Federal resources and assistance will all be coordinated through the state. Tribal Nations, as sovereign entities, may request disaster assistance directly from the federal government.

Triage

Triage generally refers to prioritization for care or resources. There are three basic types of triage:

- **Primary triage:** performed at first assessment and prior to any interventions (e.g. triage upon entry to the ED by EMS at the scene)
- **Secondary triage:** performed after additional assessments and initial interventions (e.g. triage performed by surgery staff after an initial CT scan)
- **Tertiary triage:** performed after or during the provision of definitive diagnostics and medical care (e.g. triage performed by critical care staff after intubation and mechanical ventilation with assessment of physiologic variables)

Primary, secondary and tertiary triage can be categorized as either **reactive triage** or **proactive triage**.

Reactive Triage

Reactive triage occurs in the early phases of the incident when the responders know less information regarding the incident. Physicians and nurses make triage decisions based on their best judgment, through individualized determinations using objective medical evidence. Generally, patients with altered mental status, signs of shock, penetrating torso injury, uncontrolled bleeding, and respiratory distress are highest priority. It is only in primary and secondary mass casualty circumstances when patients may need to be categorized as expectant and therefore to receive palliative care as their only intervention. *Primary and secondary triage are often reactive triage.*

Factors to consider:

- Time required to perform treatment
- Clinical skill requirements (i.e. how much physician/nursing expertise is required)
- Treatment requirements (what are the resource requirements)
- Prognosis of the injury

In general, the more victims there are, the more the triage process should prioritize the moderately injured that require interventions that will save their life and can be rapidly performed (e.g. chest tube, airway management, and tourniquet). Finally, if multiple patients present with identical prognosis to a hospital that has minimal resources, a first-come, first-served or lottery strategy may have to be implemented.

It is critical to re-evaluate patients as more resources arrive.

Proactive Triage

Proactive triage may be required later in an incident that continues to overwhelm the health care system after initial stabilization and delivery of available resources. The situation and resources are now known. Decisions revolve around whether resources can continue to be expended given the patient prognosis and availability of resources. *Tertiary triage is a form of*

proactive triage. Proactive triage of resources should only occur when the following conditions are met and unless specified otherwise, the patient should continue to receive all other means of support. The patient should always have equitable access to medications to control pain and suffering to the degree possible given the circumstances:

Proactive triage conditions to meet:

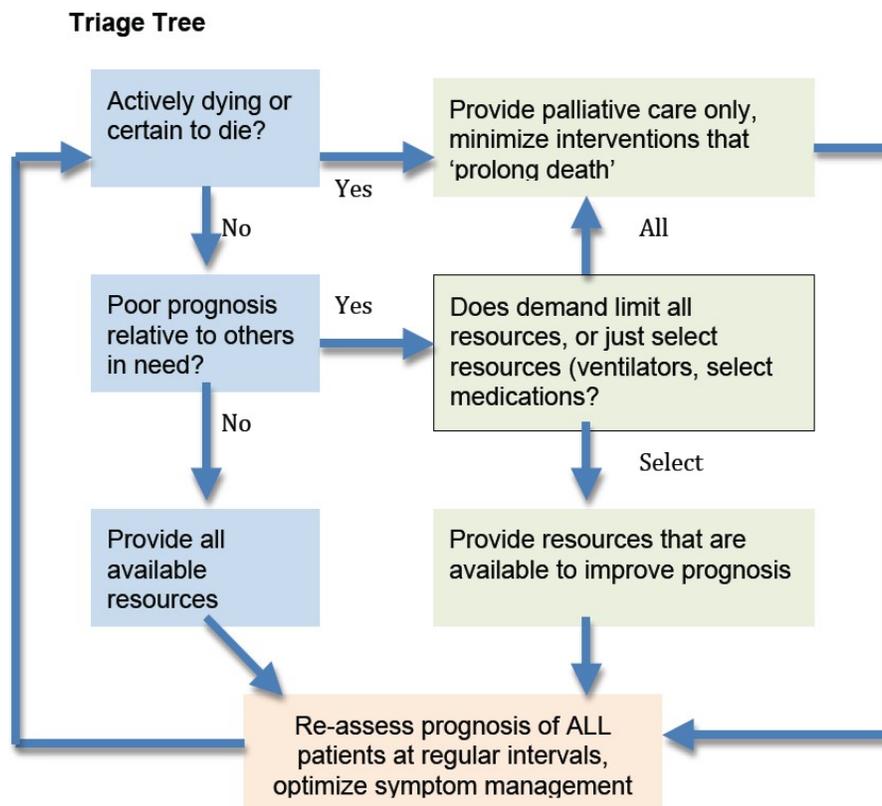
- Critically limited resource(s) and infrastructure are identified.
- Surge capacity is fully employed within health care facilities (and regionally) if capacity/space is the limited resource.
- Maximum efforts to conserve, substitute, adapt, and re-use are insufficient if supplies are the limited resource.
- Patient transfer or resource importation is not possible or will occur too late for bridging therapies (such as bag-valve ventilation or other temporizing measures) to be considered.
- Necessary resources have been requested from local and regional health officials (as applicable).
- A state of emergency has been declared, or other health powers (as applicable) have been activated.
- Regional, state, and federal resources are insufficient or cannot meet demand.

Before implementing proactive or tertiary triage, facilities must have firmly established triage processes and plans that take into consideration available objective evidence, resources, and have administrative backing of the facility. Every effort should be made to notify in advance local and regional partners to ensure outside resources or assistance is not available.

The Patient Care Strategies for Scarce Resource Situations at the end of this document can assist facilities in decision-making; however, it is ultimately up to the facility to determine and implement its own process. In situations where proactive triage is required during a prolonged incident, CDPH may convene the Science Advisory Team (SAT) to provide recommendations to the State Public Health Officer. In turn, the State Public Health Officer may provide additional recommendations to California's health system during an incident.

The tertiary (proactive) triage *process* is far more important than the specific clinical decision tools, which may vary based on the event. It is recommended frontline clinicians caring for patients should not be directly involved in the triage process; rather, they should provide clinical knowledge to the decision-making body who will make determinations of care. Facilities should have a Clinical Care Committee and/or Triage Team available for consultation. This function may be provided regionally and remotely. For example, health systems may provide this function for all their health care facilities and the same team may provide assistance to outside health care facilities that wish to refer patients or do not have the resources to make triage decisions. The Clinical Care Committee and/or subject matter experts should provide a process and agree on indications for treatment (e.g. specific medications) or approve decision tools for triage of ICU and other resources based on up to date information on the availability of scarce resources.

Figure 2: Basic Triage Tree Based on Objective Medical Evidence



Ethical Considerations

A public health emergency compels transition from individual patient-focused clinical care to population-oriented public health approach with the goal of providing the best possible outcome for the largest number of impacted people. With regards to allocation and reallocation decisions facilities should establish a triage team or committee composed of people who have no clinical responsibilities for the care of the patient.

Basic biomedical ethical principles should be incorporated into decision making regarding allocation of healthcare resources. These are:

- **Autonomy:** respect for persons and their ability to make decisions for themselves may be overridden by decisions for the greater good; however, patients must still be treated with dignity and compassion
- **Beneficence:** care providers must subordinate their personal and institutional interests and shift from those in the best interest of the patient to those in the best interest of the population as a whole
- **Justice:** equitable distribution of resources; allocation decisions applied consistently across people and across time; transparency and accountability; fair processes and procedural justice to sustain public trust

In general, triage decisions must meet the five basic requirements outlined in the IOM/NAM 2012 publication:

- **Fair and Equitable:** process recognized as fair, equitable, evidence based, and responsive to specific needs of individuals and the population focused on a duty of compassion and care, a duty to steward resources, and a goal of maintaining the trust of patients and the community.
- **Transparency:** in design and decision-making.
- **Consistency:** in application across populations and among individuals.
- **Proportionality:** public and individual requirements must be commensurate with the scale of the emergency and degree of scarce resources (i.e. the restrictions on care should not be more restrictive than the situation requires – and this may require re-evaluation as more resources become available).
- **Accountability:** of individuals making the decisions and of the facilities and governments to support the processes and the providers.

Guiding ethical principles used in defining allocations of scarce resources and proactive or tertiary triage include:

- Duty to implement distributive justice – (socially just allocation of goods)
- Duty to care: treat people with dignity and respect
- Duty to plan: steward resources and promote instrumental value
- Duty to transparency (in planning and implementation)

Surge Capacity

Surge capacity is a measurable representation of ability to manage a sudden influx of patients. It is dependent on a well-functioning HICS structure and the variables of space, supplies, staff and special considerations. All health care facilities are required by the Joint Commission to establish an emergency management process and define an Emergency Operations Plan (EOP) which details actions to increase surge capacity, with specific actions in three categories: space, staff, and supplies. These actions include but are not limited to defining additional treatment space and/or alternate care sites, early discharges, cancelation of surgeries and elective procedures, increasing staffing, and more.

Intensive Care Unit

Pandemics can result in a large need for intensive care. For planning purposes, ICU services should include the ability to provide cardiac monitoring, invasive monitoring, mechanical ventilation, and hemodynamic management. Many facilities do not provide these services, although at a minimum, they should be able to provide initial resuscitation and management awaiting transfer to another facility. In certain situations, a health care facility that normally refers critically ill patients may have to continue to provide care for hours to days longer than usual or may elect to provide ongoing critical care using transport ventilators and other resources. In these cases, critical care consultation should be obtained via phone or telemedicine to provide expert input on the care provided until transfer can be arranged or critical care is no longer required.

The American College of Chest Physicians has guidance documents on ICU surge published in 2014. The executive summary with all the suggestions can be found at [Introduction and Executive Summary Care of the Critically Ill and Injured during Pandemics and Disasters: CHEST Consensus Statement](#). Each of the sections has a supporting article (e.g. surge capacity logistics) with further details.

According to the key recommendations made by the American College of Chest Physicians, hospitals that provide inpatient critical care should be able to:

- Surge 20% of usual ICU capacity within hours
- Surge 100% of usual ICU capacity within 24 hours using facility or regional healthcare community assets
- Surge 200% of usual ICU capacity within days using regional, state, or federal assets

In order to accomplish this, health care facilities providing ICU services should determine the additional space they can use for ICU level care. Procedural and surgical areas including pre- and post-op care areas are likely targets as they may already have the monitoring equipment necessary for critical care. Health care facilities may wish to create a grid for ICU surge indicating the sequence/preference and numbers of beds (as well as additional supplies needed for those areas) to be used.

Few hospitals will have the ventilator and cardiac monitor resources to achieve a 100-200% surge, but understanding the needs and planning for it is critical to being able to request the necessary assets in a timely manner from regional and Federal sources.

Inherent in the ICU surge plan is an understanding that the overall acuity at your health care facility will increase markedly and lower acuity patients may need to be discharged to outpatient care, referred to homecare or long-term care, or provided care at an alternate care site. This may necessitate changes in discharge protocols and health care facility policies about what patients will be cared for on what units.

Alternative Care Sites

Alternate Care Sites (ACS) can provide overflow hospital capacity during a pervasive or catastrophic public health event. By providing care to less complex inpatients, an ACS can increase a hospital's capacity to care for higher acuity patients. A hospital may open an on-site ACS or a community site in conjunction with the local health system (via multi-agency coordination) to staff and refer appropriate patients to the facility. Examples of some services available at an ACS include:

- Oxygen
- Intravenous fluids
- Medications
- Basic laboratory testing

Emergency or critical care services are generally not supported at an ACS. Health care services should also be available at community shelters including resources for those with chronic illness. If needed to meet surge demands an ACS should be implemented by HCC partners as part of a regional strategy to address incident demands and may include virtual as well as physical patient contact and interventions. In addition, the state may be able to support regional ACS with state or federal assets.

Conclusion

Effective crisis care planning for health care facilities depends on multiple factors including the following:

- Crisis conditions may be caused by severe increases in demand and/or facility damage and require immediate facility and regional response, with State actions supporting these response strategies.
- Crisis of care plans should be an extension of hospital surge capacity plans. Integration into the facility all-hazards Emergency Operations Plan is important for seamless response. Formal resource allocation and triage processes may be written into a separate appendix or Attachment.
- Crisis conditions should prompt coalition and, when necessary, prompt State actions to assure that resources are obtained to move care back to contingency and then conventional status as soon as possible.
- Having a process to involve Subject Matter Experts at the facility in the Incident Command process (including creation of a Clinical Care Committee when feasible based on facility/health system size) is critical to assure fairness and best clinical practices given the limitations of the situation.
- Having a triage process in place is much more important than specific triage decision support tools.

Appendix A: Ventilator Management

Before implementation of a ventilator allocation/reallocation plan hospitals must have exhausted every resource to increase available ventilators, including but not limited to health system resources, healthcare coalition partners, and state resources through the MHOAC. Any impending need to implement this management scheme must include notification of health system leadership and CDPH.

This guideline is based on guidelines and work done at the University of Pittsburg and published at: White DB, Lo B. A framework for rationing ventilators and critical care beds during the COVID-19 pandemic. *JAMA*. doi:10.1001/jama.2020.5046. eAppendix. Allocation of Scarce Critical Care Resources During a Public Health Emergency

The document presents recommendations for ethical and medical best practices for allocating ventilators during a disaster. These recommendations provide guidance but should continue to be reviewed by hospital emergency managers and subject matter experts with the explicit goal of improvement and incorporation into facility EOPs and pandemic planning. Neutral ventilator triage teams including suggested membership should receive yearly training drills and may need to be involved in pre-planning for any catastrophe. Ventilator allocation and reallocation decisions should be performed by a triage team or committee composed of people who have no clinical responsibilities for the care of the patient.

Creation of Triage Teams

The purpose of this section is to provide guidance to create a local triage team at each hospital whose responsibility is to implement the allocation framework described in Sections 2 and 3. It is important to emphasize that patients' treating physicians should not make triage decisions. These decisions prioritize public ethics over clinical ethics where the two come into conflict, and therefore a triage team with expertise in medical ethics and the allocation framework should make allocation decisions. The separation of the triage role from the clinical role is intended to enhance objectivity, avoid conflicts of commitments, and minimize psychological moral distress.

Triage Officer

A group of triage officers should be appointed. Desirable qualities of triage officers include being a physician with experience managing critically ill patients, strong leadership ability, and effective communication and conflict resolution skills. This individual will oversee the triage process, assess all patients, assign a level of priority for each, communicate with treating physicians, and direct attention to the highest-priority patients (see allocation process below). S/he is expected to make decisions according to the allocation framework described below, which is designed to benefit the greatest number of patients, even though these decisions may not necessarily be best for some individual patients. To optimize effective functioning in a crisis, the triage officer should ideally be well prepared and trained in advance by means of disaster drills or exercises. The triage officer has the responsibility and authority to apply the principles and processes of this document to make decisions about which patients will receive the highest priority for receiving critical care. S/he is also empowered to make decisions regarding reallocation of critical care resources that have

previously been allocated to patients, again using the principles and processes in this document. In making these decisions, the triage officer should not use principles or beliefs that are not included in this document.

So that the burden is fairly distributed, triage officers will be nominated by the chairs/directors of the clinical departments that provide care to critically ill patients. The CMO, CEO, and other hospital leadership as needed should approve all nominees. A roster of approved triage officers should be maintained that is large enough to ensure that triage officers will be available on short notice at all times, and that they will have sufficient rest periods between shifts.

Triage Team

In addition to the triage officer, if resources allow, the triage team should also consist of a nurse with acute care (e.g., critical care or emergency medicine) experience (even if no longer clinically active), and one administrative staff member who will conduct data-gathering activities, documentation and record keeping, and assistance liaising with a hospital Command Center or bed management. The staff member must be provided with appropriate computer and IT support to maintain updated databases of patient priority levels and scarce resource usage (total numbers, location, and type). The role of triage team members is to provide information to the triage officer and to help facilitate and support her/his decision-making process. A representative from hospital administration should also be linked to the team, in order to supervise maintenance of accurate records of triage scores and to serve as a liaison with hospital leadership.

The triage officer and team members should function in shifts lasting no longer than 13 hours (to enable 30 minutes of overlap and handoffs on each end). Therefore, there should be at least two shifts per day to fully staff the triage function. Team decisions and supporting documentation should be reported daily to appropriate hospital leadership and incident command.

Triage Mechanism

The triage officer and her/his team will use the allocation framework, detailed in Section 2, to determine priority scores of all patients eligible to receive the scarce critical care resource. For patients already being supported by the scarce resource, the evaluation will include reassessment to evaluate for clinical improvement or worsening at pre-specified intervals, as detailed in Section 3. The triage officer will review the comprehensive list of priority scores for all patients and will communicate with the clinical teams immediately after a decision is made regarding allocation or reallocation of a critical care resource.

Communication of triage decisions to patients and families

Although the *authority* for triage decisions rests with the triage officer, there are several potential strategies to *communicate* triage decisions to patients and families. Communication or disclosure of such triage decisions to patients and/or their next of kin is a required

component of a fair allocation process that provides respect for persons.⁶ The triage officer should first inform the affected patient's attending physician about the triage decision. Those two physicians should collaboratively determine the best approach to inform the individual patient and family. Options for who should communicate the decision include: 1) solely the attending physician; 2) solely the triage officer; or 3) a collaborative effort between the attending physician and triage officer. The best approach will depend on a variety of case-specific factors, including the dynamics of the individual doctor-patient-family relationship and the preferences of the attending physician. If the attending physician is comfortable with disclosing her- or him-self, this approach is useful because the communication regarding triage will bridge naturally to a conveyance of prognosis, which is a responsibility of bedside physicians, and because it may limit the number of clinicians exposed to a circulating pathogen. The third (collaborative) approach is useful because it may lessen moral distress for individual clinicians and may augment trust in the process, but these benefits must be balanced against the risk of greater clinician exposure. Under this approach, the attending physician would first explain the severity of the patient's condition in an emotionally supportive way, and then the triage officer would explain the implications of those facts in terms of the triage decision. The triage officer would also emphasize that the triage decision was not made by the attending physician but is instead one that arose from the extraordinary emergency circumstances, and reflect a public health decision. Regardless of who communicates the decision, it may be useful to explain the medical factors that informed the decision, as well as the factors that were not relevant (e.g., race, ethnicity, gender, insurance status, perceptions of social worth, immigration status, etc.). If resources permit, palliative care clinicians or social workers should be present or available to provide ongoing emotional support to the patient and family.

Appeals process for individual triage decisions

It is possible that patients, families, or clinicians will challenge individual triage decisions. Procedural fairness requires the availability of an appeals mechanism to resolve such disputes. On practical grounds, different appeals mechanisms are needed for the initial decision to allocate a scarce resource among individuals, none of whom are currently using the resource, and the decision whether to withdraw a scarce resource from a patient who is not clearly benefiting from that resource. This is because initial triage decisions for patients awaiting the critical care resource will likely be made in highly time-pressured circumstances. Therefore, an appeal will need to be adjudicated in real time to be operationally feasible. For the initial triage decision, the only permissible appeals are those based on a claim that an error was made by the triage team in the calculation of the priority score or use/non-use of a tiebreaker (as detailed in Section 2). The process of evaluating the appeal should include the triage team verifying the accuracy of the priority score calculation by recalculating it. The treating clinician or triage officer should be prepared to explain the calculation to the patient or family on request.

Decisions to withdraw a scarce resource such as mechanical ventilation from a patient who is already receiving it may cause heightened moral concern. Furthermore, such decisions depend on more clinical judgment than initial allocation decisions. Therefore, there should be a more robust process for appealing decisions to withdraw or reallocate critical care beds or services. Elements of this appeals process should include:

- The individuals appealing the triage decision should explain to the triage officer the grounds for their appeal. Appeals based in an objection to the overall allocation

framework should not be granted.

- The triage team should explain the grounds for the triage decision that was made.
- Appeals based in considerations other than disagreement with the allocation framework should immediately be brought to a Triage Review Committee that is independent of the triage officer/team and of the patient's care team (see below for recommended composition of this body).
- The appeals process must occur quickly enough that the appeals process does not harm patients who are in the queue for scarce critical care resources currently being used by the patient who is the subject of the appeal
- The decision of the Triage Review Committee or subcommittee for a given hospital will be final.
- Periodically, the Triage Review Committee should retrospectively evaluate whether the review process is consistent with effective, fair, and timely application of the allocation framework.

The Triage Review Committee should be made up of at least three individuals, recruited from the following groups or offices: Chief Medical Officer or designee, Chief Nursing Officer or other Nursing leadership, Legal Counsel, a hospital Ethics Committee or Consult Service, members of an institution's ethics faculty, and/or an off-duty triage officer. Three committee members are needed for a quorum to render a decision, using a simple majority vote. The process can happen by telephone or in person, and the outcome will be promptly communicated to whomever brought the appeal.

Allocation process for ICU admission/ventilation

The purpose of this section is to describe the allocation framework that should be used to make initial triage decisions for patients who present with illnesses that typically require critical care resources (i.e., illnesses that cannot be managed on a hospital ward in that hospital). The scoring system applies to all patients presenting with critical illness, not merely those with the disease or disorders that have caused the public health emergency. For example, in the setting of a severe pandemic, those patients with respiratory failure from illnesses not caused by the pandemic illness will also be subject to the allocation framework. This process involves two steps, detailed below:

1. Calculating each patient's priority score based on the multi-principle allocation framework;
2. Determining each day how many priority groups will receive access to critical care interventions.

First responders and bedside clinicians should perform the immediate stabilization of any patient in need of critical care, as they would under normal circumstances. Along with stabilization, temporary ventilatory support if available may be offered to allow the triage officer to assess the patient for critical resource allocation. Every effort should be made to complete the initial triage assessment within 90 minutes of the recognition of the likely need for critical care resources.

Ethical goal of the allocation framework. Consistent with accepted standards during public health emergencies, the primary goal of the allocation framework is to maximize benefit for populations of patients, often expressed as "doing the greatest good for the greatest

number.”

STEP 1: Calculate each patient’s priority score using the multi-principle allocation framework. This allocation framework is based primarily on two considerations: 1) saving the most lives; and 2) saving the most life-years. Patients who are more likely to survive with intensive care are prioritized over patients who are less likely to survive with intensive care. Patients who do not have serious comorbid illness are given priority over those who have illnesses that limit their life expectancy. As summarized in **Table 1**, the Sequential Organ Failure Assessment (SOFA) score (or an alternate, validated, objective measure of probability of survival to hospital discharge) is used to determine patients’ prognoses for hospital survival. In addition, the presence of life-limiting comorbid conditions, as determined by the triage team, is used to characterize patients’ longer-term prognosis.

Table 1. Sequential Organ Failure Assessment (SOFA) score SOFA Scale

Variable	0	1	2	3	4
PaO2/FiO2 mmHg	>400	≤ 400	≤ 300	≤ 200	≤ 100
Platelets, x 103/μL (x 106/L)	> 150 (>150)	≤ 150 (≤ 150)	≤ 100 (≤ 100)	≤ 50 (≤ 50)	≤ 20 (≤ 20)
Bilirubin, mg/dL (μmol/L)	<1.2 (<20)	1.2-1.9 (20 – 32)	2.0-5.9 (33 – 100)	6.0-11.9 (101 – 203)	>12 (> 203)
Hypotension	None	MABP < 70 mmHg	Dop ≤ 5	Dop > 5, Epi ≤ 0.1, Norepi ≤ 0.1	Dop > 15, Epi > 0.1, Norepi >0.1
Glasgow Coma Score	15	13 – 14	10 - 12	6 - 9	<6
Creatinine, mg/dL (μmol/L)	< 1.2 (<106)	1.2-1.9 (106 – 168)	2.0-3.4 (169 - 300)	3.5–4.9 (301 – 433)	>5 (> 434)

Sequential Organ Failure Assessment (SOFA) score SOFA Scale

Dopamine [Dop], epinephrine [Epi], norepinephrine [Norepi] doses in ug/kg/min SI units in brackets

Adapted from: Ferreira FI, Bota DP, Bross A, Melot C, Vincent JL. Serial evaluation of the SOFA score to predict outcome in critically ill patients. JAMA 2001; 286(14): 1754-1758.

Table 2. Multi-principle Strategy to Allocate Critical Care/Ventilators During a Public Health Emergency

Principle	Specification	Point System*			
		1	2	3	4
Save the most lives	Prognosis for short-term survival (SOFA score#)	SOFA score < 6	SOFA score 6-8	SOFA score 9-11	SOFA score ≥12
Save the most life-years	Prognosis for long-term survival (medical assessment of comorbid conditions)	...	Major comorbid conditions with substantial impact on long-term survival	...	Severely life-limiting conditions; death likely within 1 year

#SOFA= Sequential Organ Failure Assessment; note that another measure of acute physiology that predicts in-hospital mortality, such as LAPS2 score, could be used in place of SOFA, but should similarly be divided into 4 ranges. *Scores range from 1-8, and persons with the lowest score would be given the highest priority to receive critical care beds and services.

Points are assigned according to the patient’s SOFA score (range from 1 to 4 points) plus the presence or absence of comorbid conditions (2 points for major life-limiting comorbidities, 4 points for life-limiting comorbidities likely to cause death within a year (Table 2, and Table 3)). These points are then added together to produce a total priority score, which ranges from 1 to 8. Lower scores indicate higher likelihood of benefiting from critical care, and priority will be given to those with lower scores.

Table 3. Examples of Major Comorbidities and Severely Life Limiting Comorbidities*

Examples of Major comorbidities (associated with significantly decreased long-term survival)	Examples of Severely Life Limiting Comorbidities (commonly associated with survival < 1 year)
<ul style="list-style-type: none"> • Moderate Alzheimer’s disease or related dementia • Malignancy with a < 10 year expected survival • New York Heart Association Class III heart failure • Moderately severe chronic lung disease (e.g., COPD, IPF) • End-stage renal disease in patients < 75 • Severe multi-vessel CAD • Cirrhosis with history of decompensation 	<ul style="list-style-type: none"> • Severe Alzheimer’s disease or related dementia • Cancer being treated with only palliative interventions (including palliative chemotherapy or radiation) • New York Heart Association Class IV heart failure plus evidence of frailty • Severe chronic lung disease plus evidence of frailty • Cirrhosis with MELD score ≥20, ineligible for transplant • End-stage renal disease in patients older than 75

*This Table only provides examples. There are likely other reasonable approaches to designating 0, 2, or 4 points according to the “save the most life-years” principle. Indices such as Elixhauser or COPS2 may be used, but these scores may be difficult to calculate quickly.

Other scoring considerations:

Giving heightened priority to those who have had the least chance to live through life’s stages:

We suggest that life-cycle considerations should be used as a tiebreaker (see below) if there are not enough resources to provide to all patients within a priority group, with priority going to younger patients. We recommend the following categories: age 12-40, age 41-60; age 61-75; older than age 75. The ethical justification for incorporating the life-cycle principle is that it is a valuable goal to give individuals equal opportunity to pass through the stages of life—childhood, young adulthood, middle age, and old age.⁷ The justification for this principle does not rely on considerations of one’s intrinsic worth or social utility. Rather, younger individuals receive priority because they have had the least opportunity to live through life’s stages. Evidence suggests that, when individuals are asked to consider situations of absolute scarcity of life-sustaining resources, most believe younger patients should be prioritized over older

ones.⁸ Public engagement about allocation of critical care resources during an emergency also supported the use of the lifecycle principle for allocation decisions.⁴ Harris summarizes the moral argument in favor of life-cycle–based allocation as follows: “It is always a misfortune to die . . . it is both a misfortune and a tragedy [for life] to be cut off prematurely.”⁹

Giving heightened priority to those who are central to the public health response. Individuals who perform tasks that are vital to the public health response, including all those whose work directly supports the provision of acute care to others, should be given heightened priority. The specifics of how to operationalize this consideration will depend on the exact nature of the public health emergency. Options include subtracting points from the priority score for these individuals or using it as a tiebreaker criterion (see below). This category should be broadly construed to include those individuals who play a critical role in the chain of treating patients and maintaining societal order. However, it would not be appropriate to prioritize front-line *physicians* and not prioritize other front-line clinicians (e.g., nurses and respiratory therapists) and other key personnel (e.g., maintenance staff that disinfects hospital rooms).

Absence of categorical exclusion criteria: A central feature of this allocation framework is that it does not use categorical exclusion criteria to bar individuals from access to critical care services during a public health emergency. There are several ethical justifications for this. First, the use of rigid categorical exclusions would be a major departure from traditional medical ethics and raise fundamental questions of fairness. Second, such restrictive measures are not necessary to accomplish public health goals during a pandemic or disaster; it is equally feasible to assign all patients a priority score and allow the availability of resources to determine how many patients can receive the scarce resource. Third, categorical exclusion criteria may be interpreted by the public to mean that some groups are “not worth saving,” leading to perceptions of unfairness and distrust. In a public health emergency, public trust will be essential to ensure cooperation with restrictive public health measures. Thus, an allocation system should make clear that all individuals are “worth saving” by keeping all patients who would receive critical care during routine clinical circumstances eligible, and by allowing the availability of beds and services to determine how many eligible patients receive them. It is important to note that there are some conditions that lead to immediate or near-immediate death despite aggressive therapy such that during routine clinical circumstances clinicians do not provide critical care services (e.g., cardiac arrest unresponsive to appropriate ACLS, massive intracranial bleeds, intractable shock). During a public health emergency, clinicians should still make clinical judgments about the appropriateness of critical care using the same criteria they use during normal clinical practice.

STEP 2: Make daily determinations of how many priority groups can receive the scarce resource. Hospital leaders and triage officers should make determinations twice daily, or more frequently if needed, about what priority scores will result in access to critical care services. These determinations should be based on real-time knowledge of the degree of scarcity of the critical care resources, as well as information about the predicted volume of new cases that will be presenting for care over the near-term (several days). For example, if there is clear evidence that there is imminent shortage of critical care resources (i.e., few ventilators available and large numbers of new patients daily), only patients with the highest priority (lowest scores, e.g., 1-3) should receive scarce critical care resources. As scarcity subsides, patients with progressively lower priority (higher scores) should have access to critical care interventions.

There are at least two reasonable approaches to group patients: 1) according to their raw score on the 1-8 multi-principle allocation score; and 2) by creating 3 priority categories based on patients' raw priority scores (e.g., high priority, intermediate priority, and low priority). Using the full 1-8 scale avoids creating arbitrary cut-points on what is a continuous scale and allows all the information to be used from the priority score. Using priority categories is consistent with standard practices in disaster medicine and avoids allowing marginal differences in scores on an allocation framework that has not been extensively tested to be the determinative factor in allocation decisions. Both approaches are reasonable. The best choice depends on institutional preferences and comfort with different ways to operationalize triage protocols on the front lines of clinical care.

Suggestions on how to assign patients to color-coded priority groups. For those institutions who prefer to create broader, color-coded priority groups, this section provides suggestions on how to do so.

Once a patient's priority score is calculated using the multi-principle scoring system described in Table 2, each patient should be assigned to a color-coded triage priority group, which should be noted clearly on their chart/EHR (Table 4). This color-coded assignment of priority groups is designed to allow triage officers to create operationally clear priority groups to receive critical care resources, according to their score on the multi-principle allocation framework. For example, individuals in the red group have the best chance to benefit from critical care interventions and should therefore receive priority over all other groups in the face of scarcity. The orange group has intermediate priority and should receive critical care resources if there are available resources after all patients in the red group have been allocated critical care resources. The yellow group has lowest priority and should receive critical care resources if there are available resources after all patients in the red and orange groups have been allocated critical care resources.

Table 4. Assigning Patients to Color-coded Priority Groups

Use Raw Score from Multi-principle Scoring System to Assign Priority Category	
Level of Priority and Code Color	Priority score from Multi-principle Scoring System
RED Highest priority	Priority score 1-3
ORANGE Intermediate priority (reassess as needed)	Priority score 4-5
YELLOW Lowest priority (reassess as needed)	Priority score 6-8

Resolving “ties” in priority scores/categories between patients. In the event that there are ‘ties’ in priority scores/categories between patients and not enough critical care resources for all patients with the lowest scores, life-cycle considerations should be used as the first tiebreaker, with priority going to younger patients. We recommend the following categories: age 12-40, age 41-60; age 61-75; older than age 75. We also recommend that individuals who are vital to the acute care response be given priority, which could be operationalized in

the form of a tiebreaker.

If there are still ties after applying priority based on life-cycle considerations and consideration of healthcare workers, and if the hospital used the 3 -priority category approach described above (e.g., high, intermediate, and low priority), the raw score on the patient prioritization score may be used as a tiebreaker, with priority going to the patient with the lower raw score.

If there are still ties after these two tiebreakers are applied, a lottery (i.e., random allocation) should be used to break the tie.

It is important to reiterate that all patients will be *eligible* to receive critical care beds and services regardless of their priority score. The availability of critical care resources will determine how many eligible patients will receive critical care.

Appropriate clinical care of patients who cannot receive critical care. Patients who are not triaged to receive critical care/ventilation will receive medical care that includes intensive symptom management and psychosocial support. They should be reassessed daily to determine if changes in resource availability or their clinical status warrant provision of critical care services. Where available, specialist palliative care teams will be available for consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

Reassessment for ongoing provision of critical care/ventilation

The purpose of this section is to describe the process the triage committee should use to conduct reassessments on patients who are receiving critical care services, in order to determine whether s/he continues with the treatment.

Ethical goal of reassessments of patients who are receiving critical care services. The ethical justification for such reassessment is that, in a public health emergency when there are not enough critical care resources for all, the goal of maximizing population outcomes would be jeopardized if patients who were determined to be unlikely to survive were allowed indefinite use of scarce critical care services. In addition, periodic reassessments lessen the chance that arbitrary considerations, such as when an individual develops critical illness, unduly affect patients' access to treatment.

Approach to reassessment

All patients who are allocated critical care services will be allowed a therapeutic trial of a duration to be determined by the clinical characteristics of the disease. The decision about trial duration will ideally be made as early in the public health emergency as possible, when data becomes available about the natural history of the disease. The trial duration should be modified as appropriate if subsequent data emerge that suggest the trial duration should be longer or shorter.

The triage committee will conduct periodic reassessments of patients receiving critical care/ventilation. A multidimensional assessment should be used to quantify changes in

patients' conditions, such as recalculation of severity of illness scores, appraisal of new complications, and treating clinicians' input. Patients showing improvement will continue with critical care/ventilation until the next assessment. If there are patients in the queue for critical care services, then patients who upon reassessment show substantial clinical deterioration as evidenced by worsening SOFA scores or overall clinical judgment should have critical care withdrawn, including discontinuation of mechanical ventilation, after this decision is disclosed to the patient and/or family. Although patients should generally be given the full duration of a trial, if patients experience a precipitous decline (e.g., refractory shock and DIC) or a highly morbid complication (e.g., massive stroke) which portends a very poor prognosis, the triage team may make a decision before the completion of the specified trial length that the patient is no longer eligible for critical care treatment.

Appropriate clinical care of patients who cannot receive critical care.

Patients who are no longer eligible for critical care treatment should receive medical care including intensive symptom management and psychosocial support. Where available, specialist palliative care teams will be available for consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

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Appendix B: Pandemic Patient Care Strategies for Scarce Resource Situations

How to use this Appendix:

1. Recognize or anticipate resource shortfall.
2. Implement appropriate incident management system and plans; assign subject matter experts (technical specialists) to problem.
3. Determine degree of shortfall, expected demand, and duration; assess ability to obtain needed resources via local, regional, or national vendors or partners.
4. Find category of resource on index.
5. Refer to specific recommendations on the pages below.
6. Decide which strategies to implement and/or develop additional strategies appropriate for the facility and situation.
7. Assure consistent regional approach by informing public health authorities and other facilities if contingency or crisis strategies will continue beyond 24h and no regional options exist for re-supply or patient transfer; activate regional scarce resource coordination plans as appropriate.
8. Review strategies every operational period or as availability (supply/demand) changes.

Core strategies to be employed (generally in order of preference) during, or in anticipation of a scarce resource situation are:

1. Prepare - pre-event actions taken to minimize resource scarcity (e.g., stockpiling of medications).
2. Substitute - use an equivalent device, drug, or personnel for one that would usually be available (e.g., morphine for fentanyl).
3. Adapt – use a device, drug, or personnel that are not equivalent but that will provide sufficient care (e.g., anesthesia machine for mechanical ventilation).
4. Conserve – use less of a resource by lowering dosage or changing utilization practices (e.g., minimizing use of oxygen driven nebulizers to conserve oxygen).
5. Re-use – re-use (after appropriate disinfection/sterilization) items that would normally be single-use items.
6. Re-allocate – restrict or prioritize use of resources to those patients with a better prognosis or greater need.

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis														
Inhaled Medications <ul style="list-style-type: none"> Restrict the use of oxygen-driven nebulizers when inhalers or air-driven substitutes are available. Minimize frequency through medication substitution that results in fewer treatments (6h-12h instead of 4h-6h applications). 	<i>Substitute & Conserve</i>																	
High-Flow Applications <ul style="list-style-type: none"> Restrict the use of high-flow cannula systems as these can demand flow rates in excess of 40 LPM. Restrict the use of simple and partial rebreathing masks to 10 LPM maximum. Restrict use of Gas Injection Nebulizers as they generally require oxygen flows between 10 LPM and 75 LPM. Eliminate the use of oxygen-powered venturi suction systems as they may consume 15 to 50 LPM. Place patients on ventilators as soon as possible to avoid prolonged use of bag-valve ventilation at high oxygen flow rates 	<i>Conserve</i>																	
Air-Oxygen Blenders Eliminate the low-flow reference bleed occurring with any low-flow metered oxygen blender use. This can amount to an additional 12 LPM. Reserve air-oxygen blender use for mechanical ventilators using high-flow non-metered outlets. (These do not utilize reference bleeds). <ul style="list-style-type: none"> Disconnect blenders when not in use. 	<i>Conserve</i>																	
Oxygen Conservation Devices <ul style="list-style-type: none"> Use reservoir cannulas at 1/2 the flow setting of standard cannulas. Replace simple and partial rebreather mask use with reservoir cannulas at flow rates of 6-10 LPM. 	<i>Substitute & Adapt</i>																	
Oxygen Concentrators if Electrical Power Is Present <ul style="list-style-type: none"> Use hospital-based or independent home medical equipment supplier oxygen concentrators if available to provide low-flow cannula oxygen for patients and preserve the primary oxygen supply for more critical applications. 	<i>Substitute & Conserve</i>																	
Monitor Use and Revise Clinical Targets <ul style="list-style-type: none"> Employ oxygen titration protocols to optimize flow or % to match targets for SpO₂ or PaO₂. Minimize overall oxygen use by optimization of flow. Discontinue oxygen at earliest possible time. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Starting Example</th> <th style="width: 25%;">Initiate O₂</th> <th style="width: 25%;">O₂ Target</th> <th style="width: 25%;"></th> </tr> </thead> <tbody> <tr> <td>Normal Lung Adults</td> <td>SpO₂ <90%</td> <td>SpO₂ 90%</td> <td rowspan="3">Note: Targets may be adjusted further downward depending on resources available, the patient's Presentation, or measured PaO₂</td> </tr> <tr> <td>Infant & Peds</td> <td>SpO₂ <90%</td> <td>SpO₂ 90-95%</td> </tr> <tr> <td>Severe COPD History</td> <td>SpO₂ <85%</td> <td>SpO₂ 90%</td> </tr> </tbody> </table>	Starting Example	Initiate O ₂	O ₂ Target		Normal Lung Adults	SpO ₂ <90%	SpO ₂ 90%	Note: Targets may be adjusted further downward depending on resources available, the patient's Presentation, or measured PaO ₂	Infant & Peds	SpO ₂ <90%	SpO ₂ 90-95%	Severe COPD History	SpO ₂ <85%	SpO ₂ 90%	<i>Conserve</i>			
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Expendable Oxygen Appliances <ul style="list-style-type: none"> Use terminal sterilization or high-level disinfection procedures for oxygen appliances, small & large-bore tubing, and ventilator circuits. Bleach concentrations of 1:10, high-level chemical disinfection, or irradiation may be suitable. Ethylene oxide gas sterilization is optimal but requires a 12-hour aeration cycle to prevent ethylene chlorohydrin formation with polyvinyl chloride plastics. 	<i>Re-use</i>																	
Oxygen Re-Allocation <ul style="list-style-type: none"> Prioritize patients for oxygen administration during severe resource limitations. 	<i>Re-Allocate</i>																	

Resource: [Consideration for Oxygen Therapy in Disasters](#) This ASPR TRACIE fact sheet provides information on the types of oxygen therapy and the types of oxygen supplies generally available, as well as various oxygen storage methods.

STAFFING

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

Appendix B

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis
<p>Staff and Supply Planning</p> <ul style="list-style-type: none"> Assure facility has process and supporting policies for disaster credentialing and privileging - including degree of supervision required, clinical scope of practice, mentoring and orientation, electronic medical record access, and verification of credentials. Encourage employee preparedness planning (www.ready.gov and other resources). Cache adequate personal protective equipment (PPE) and support supplies. Educate staff on institutional disaster response. Educate staff on community, regional, and state disaster plans and resources. Develop facility plans addressing staff's family /pets or staff shelter needs. 	Prepare			
<p>Focus Staff Time on Core Clinical Duties</p> <ul style="list-style-type: none"> Minimize meetings and relieve administrative responsibilities not related to event. Implement efficient medical documentation methods appropriate to the incident. Cohort patients to conserve PPE and reduce staff PPE donning/doffing time and frequency. 	Conserve			
<p>Use Supplemental Staff</p> <ul style="list-style-type: none"> Bring in equally trained staff (burn or critical care nurses, Disaster Medical Assistance Team [DMAT], other health system or Federal sources). Equally trained staff from administrative positions (nurse managers). Adjust personnel work schedules (longer but less frequent shifts, etc.) if this will not result in skill/PPE compliance deterioration. Use family members/ lay volunteers to provide basic patient hygiene and feeding if infection control strategies allow for it - releasing staff for other duties. 	Substitute			
	Adapt			
<p>Focus Staff Expertise on Core Clinical Needs</p> <ul style="list-style-type: none"> Personnel with specific critical skills (ventilator, burn management) should concentrate on those skills; specify job duties that can be safely performed by other medical professionals. Have specialty staff oversee larger numbers of less-specialized staff and patients (e.g., a critical care nurse oversees the intensive care issues of 9 patients while 3 medical /surgical nurses provide basic nursing care to 3 patients each). Limit use of laboratory, radiographic, and other studies, to allow staff reassignment and resource conservation. Limit availability / indications for non-critical laboratory, radiographic, and other studies. Reduce documentation requirements. Restrict or cease elective appointments, surgeries, procedures, and screening tests. 	Conserve			
<p>Use Alternative Personnel to Minimize Changes to Standard of Care</p> <ul style="list-style-type: none"> Use less trained personnel with appropriate mentoring and just-in-time education (e.g., health care trainees or other health care workers, Medical Reserve Corps, retirees). Use less trained personnel to take over portions of skilled staff workload for which they have been trained. Provide just-in-time training for specific skills. Divert credentialed staff from routine to emergency duties including in-hospital or assisting public health at external clinics/screening/ dispensing sites. 	Adapt			

NUTRITIONAL SUPPORT

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis
<p>Food</p> <p>Maintain hospital supply of inexpensive, simple to prepare, long-shelf life foodstuffs as contingency for at least 96 hours with- out resupply, with additional supplies according to hazard vulnerability analysis (e.g., grains, beans, powdered milk, powdered protein products, pasta, and rice). Access existing or devise new emergency/disaster menu plans.</p> <p>Maintain hospital supply of at least 30 days of enteral and parenteral nutrition components and consider additional supplies based on institution-specific needs. Review vendor agreements and their contingencies for delivery and production, including alternate vendors. Note: A 30-day supply based on usual use may be significantly shortened by the demand of a disaster. Infant feeding: Support breastfeeding; use local WIC agencies to provide telephone lactation support; assure adequate stocks of formula for those babies who need it.</p>	Prepare			
<p>Water</p> <ul style="list-style-type: none"> Stock bottled water sufficient for drinking needs for at least 96 hours if feasible (for staff, patients and family/visitors), or assure access to drinking water apart from usual supply. Potential water sources include food and beverage distributors. Consider weight and dispensing issues if using 5-gallon bottles. Ensure there is a mechanism in place to verify tap water is safe to drink. 	Prepare			
<p>Staff/Family</p> <p>Plan to feed additional staff, patients, and family members of staff/patients in select situations (ice storm as an example of a short-term incident, an epidemic as an example of a long-term incident). Consider having staff bring own food if practical and safe to do so.</p>	Prepare			
<p>Planning</p> <ul style="list-style-type: none"> Work with stakeholders to encourage home users of enteral and parenteral nutrition to have contingency plans and alternate delivery options. Home users of enteral nutrition typically receive delivery of 30-day supply and home users of parenteral nutrition typically receive a weekly supply. Anticipate receiving supply requests from home users during periods of shortage. Work with vendors regarding their plans for continuity of services and delivery. Identify alternate sources of food supplies for the facility should prime vendors be unavailable (including restaurants - which may be closed during epidemics). Consider additional food supplies at hospitals that do not have food service management accounts. Determine if policy on family provision of food to patients is in place, and what modifications might be needed or permitted in a disaster. <p>Liberalize diets and provide basic nutrients orally, if possible. Total parenteral nutrition (TPN) use should be limited and prioritized for neonatal and critically ill patients.</p> <p>Non-clinical personnel serve meals and may assist preparation.</p> <ul style="list-style-type: none"> Follow or modify current facility guidelines for provision of food/feeding by family members of patients. Anticipate and have a plan for the receipt of food donations. If donated food is accepted, it should be non-perishable, prepackaged, and preferably in single serving portions. Collaborate with pharmacy and nutrition services to identify patients appropriate to receive parenteral nutrition support vs. enteral nutrition. Access premixed TPN/PPN solutions from vendor if unable to compound. Refer to Centers for Disease Control (CDC) Fact Sheets and American Society for Parenteral and Enteral Nutrition (ASPEN) Guidelines. Substitute oral supplements for enteral nutrition products if needed. <p>Eliminate or modify special diets temporarily.</p> <p>Use blenderized food and fluids for enteral feedings rather than enteral nutrition products if shortages occur.</p>	Prepare			
	Substitute			
	Adapt			
	Substitute & Adapt			
	Adapt			

MEDICATION ADMINISTRATION

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis												
<p>Cache/Increase Supply Levels*</p> <ul style="list-style-type: none"> Patients should have at least 30-day supply of home medications and obtain 90-day supply if pandemic, epidemic, or evacuation is imminent. Examine formulary to determine commonly used medications and classes that will be in immediate/ high demand. This may involve coordination with pharmacies Increase supply levels or cache critical medications - particularly for low-cost items and analgesics. Key <table border="1" data-bbox="157 456 1358 850"> <tr> <td data-bbox="157 456 338 521">Analgesia</td> <td data-bbox="338 456 1358 521">Morphine, other narcotic and non-narcotic (non-steroidals, acetaminophen) class - injectable and oral</td> </tr> <tr> <td data-bbox="157 521 338 565">Sedation</td> <td data-bbox="338 521 1358 565">Particularly benzodiazepine (lorazepam, midazolam, diazepam) injectables, ketamine, and anti-psychotic agents.</td> </tr> <tr> <td data-bbox="157 565 338 659">Anti-infective</td> <td data-bbox="338 565 1358 659"> <ul style="list-style-type: none"> Narrow and broad-spectrum antibiotics for pneumonia, skin infections, open fractures, sepsis (e.g.: cephalosporins, quinolones, tetracyclines, macrolides, clindamycin, penam class and extended spectrum penicillins, etc.), select antivirals. </td> </tr> <tr> <td data-bbox="157 659 338 703">Pulmonary</td> <td data-bbox="338 659 1358 703">Metered dose inhalers (albuterol, inhaled steroids), oral steroids (dexamethasone, prednisone).</td> </tr> <tr> <td data-bbox="157 703 338 764">Behavioral Health</td> <td data-bbox="338 703 1358 764">Haloperidol, other injectable and oral anti-psychotics, common anti-depressants, anxiolytics.</td> </tr> <tr> <td data-bbox="157 764 338 850">Other</td> <td data-bbox="338 764 1358 850">Sodium bicarbonate, paralytics, induction agents (etomidate, propofol), proparacaine/tetracaine, atropine, pralidoxime, epinephrine, local anesthetics, antiemetics, insulin, common oral anti-hypertensive, diabetes medications, tetanus vaccine and tranexamic acid, anti-epileptics (IV and oral), hypertonic saline, and anti-diarrheals.</td> </tr> </table>	Analgesia	Morphine, other narcotic and non-narcotic (non-steroidals, acetaminophen) class - injectable and oral	Sedation	Particularly benzodiazepine (lorazepam, midazolam, diazepam) injectables, ketamine, and anti-psychotic agents.	Anti-infective	<ul style="list-style-type: none"> Narrow and broad-spectrum antibiotics for pneumonia, skin infections, open fractures, sepsis (e.g.: cephalosporins, quinolones, tetracyclines, macrolides, clindamycin, penam class and extended spectrum penicillins, etc.), select antivirals. 	Pulmonary	Metered dose inhalers (albuterol, inhaled steroids), oral steroids (dexamethasone, prednisone).	Behavioral Health	Haloperidol, other injectable and oral anti-psychotics, common anti-depressants, anxiolytics.	Other	Sodium bicarbonate, paralytics, induction agents (etomidate, propofol), proparacaine/tetracaine, atropine, pralidoxime, epinephrine, local anesthetics, antiemetics, insulin, common oral anti-hypertensive, diabetes medications, tetanus vaccine and tranexamic acid, anti-epileptics (IV and oral), hypertonic saline, and anti-diarrheals.	<i>Prepare</i>			
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<p>Use Equivalent Medications</p> <ul style="list-style-type: none"> Obtain medications from alternate supply sources (pharmaceutical distributors, pharmacy caches). Explore options to compound or obtain from compounding pharmacies. <table border="1" data-bbox="157 967 1346 1227"> <tr> <td data-bbox="157 967 338 1011">Pulmonary</td> <td data-bbox="338 967 1346 1011">Metered dose inhalers instead of nebulized medications.</td> </tr> <tr> <td data-bbox="157 1011 338 1127">Analgesia/Sedation</td> <td data-bbox="338 1011 1346 1127"> <ul style="list-style-type: none"> Consider other medications (e.g. benzodiazepines, dexmedetomidine etc.) for propofol substitution (and other agents in short supply) ICU analgesia/sedation drips Morphine 4-10mg IV load then 2mg/h and titratee/re-bolus as needed usual 3-20m g/h); lorazepam 2-8mg or midazolam 1-5mg IV load then 2-8mg/h drip. </td> </tr> <tr> <td data-bbox="157 1127 338 1188">Anti-infective</td> <td data-bbox="338 1127 1346 1188"> <ul style="list-style-type: none"> Examples: cephalosporins, gentamicin, clindamycin substitute for unavailable broad-spectrum antibiotic Target therapy as soon as possible based upon organism identified. </td> </tr> <tr> <td data-bbox="157 1188 338 1227">Other</td> <td data-bbox="338 1188 1346 1227">Beta blockers, diuretics, calcium channel blockers, ace inhibitors, anti-depressants, anti-infectives.</td> </tr> </table>	Pulmonary	Metered dose inhalers instead of nebulized medications.	Analgesia/Sedation	<ul style="list-style-type: none"> Consider other medications (e.g. benzodiazepines, dexmedetomidine etc.) for propofol substitution (and other agents in short supply) ICU analgesia/sedation drips Morphine 4-10mg IV load then 2mg/h and titratee/re-bolus as needed usual 3-20m g/h); lorazepam 2-8mg or midazolam 1-5mg IV load then 2-8mg/h drip. 	Anti-infective	<ul style="list-style-type: none"> Examples: cephalosporins, gentamicin, clindamycin substitute for unavailable broad-spectrum antibiotic Target therapy as soon as possible based upon organism identified. 	Other	Beta blockers, diuretics, calcium channel blockers, ace inhibitors, anti-depressants, anti-infectives.	<i>Substitute</i>							
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	<i>Substitute</i>															
<p>Reduce Use During High Demand</p> <p>Restrict use of certain classes if limited stocks likely to run out (restrict use of prophylactic/empiric antibiotics after low risk wounds, etc.)</p> <p>Decrease dose; consider using smaller doses of medications in high demand/likely to run out (reduce doses of medications allowing blood pressure or glucose to run higher to ensure supply of medications adequate for anticipated duration of shortage).</p> <ul style="list-style-type: none"> Allow use of personal medications (inhalers, oral medications) in hospital. Do without - consider impact if medications not taken during shortage (statins, etc.). 	<i>Conserve</i>															

MEDICATION ADMINISTRATION
STRATEGIES FOR SCARCE RESOURCE SITUATIONS (cont.)

Appendix B

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis
<p>Modify Medication Administration</p> <ul style="list-style-type: none"> Emphasize oral, nasogastric, subcutaneous routes of medication administration. Administer medications by gravity drip rather than IV pump if needed: <i>IV drip rate calculation - drops/minute= amount to be infused x drip set/time (minutes) (drip set= qtts/mL - 60, 10, etc.).</i> Rule of 6: pt wgt (kg) x 6 = mg drug to add to 100ml fluid = 1mcg/kg/min for each 1 ml/hour NOTE: For examples, see http://www.dosagehelp.com/iv_rate_drop.html Consider use of select medications beyond expiration date**, especially tablets/capsules Consider use of veterinary medications when alternative treatments are not available** 	<i>Adapt</i>			
<p>Restrict Allocation of Select Medications</p> <ul style="list-style-type: none"> Allocate limited stocks of medications with consideration of regional/state guidance and available epidemiological information (e.g., anti-viral medications such as oseltamivir). Determine patient priority to receive medications in limited stock. 	<i>Adapt</i>			
	<i>Re-Allocate</i>			
	<i>Re-Allocate</i>			

*Resources: [ASPR TRACIE Hospital Disaster Pharmacy Calculator](#). This tool estimates the number of patients that should be planned for based on the size of the emergency department and the role of the hospital.

[ASPR TRACIE Factsheet: Drug Shortages and Disasters](#). This factsheet can help health care providers prepare for and respond to drug shortages that may arise during and after a disaster

**Legal protection such as Food and Drug Administration approval or waiver required.

HEMODYNAMIC SUPPORT AND IV FLUIDS

Appendix B

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis				
Cache Additional Intravenous (IV) Cannulas, Tubing, Fluids, Medications, and Administration Supplies	<i>Prepare</i>							
Use Scheduled Dosing and Drip Dosing When Possible <ul style="list-style-type: none"> Reserve IV pump use for critical medications such as sedatives and hemodynamic support. 	<i>Conserve</i>							
Minimize Invasive Monitoring <ul style="list-style-type: none"> Substitute other assessments (e.g., clinical signs, ultrasound) of central venous pressure (CVP). When required, assess CVP intermittently via manual methods using bedside saline manometer or transducer moved between multiple patients as needed, or by height of blood column in CVP line held vertically while patient supine. 	<i>Substitute & Conserve</i>							
Emphasize Oral Hydration Instead of IV Hydration When Possible <table border="1" data-bbox="115 597 1318 815"> <tr> <td data-bbox="115 597 325 690">Utilize appropriate oral rehydration solution</td> <td data-bbox="325 597 1318 690">Oral rehydration solution: 1 liter water (5 cups) + 1 tsp salt + 8 tsp sugar, add flavor (e.g., ½ cup orange juice, other) as needed. Rehydration for moderate dehydration 50-100mL/kg over 2-4 hours</td> </tr> <tr> <td data-bbox="115 690 325 815">Pediatric hydration</td> <td data-bbox="325 690 1318 815">Pediatric maintenance fluids: <ul style="list-style-type: none"> 4 ml /kg/h for first 10kg of body weight (40 ml/h for 1st 10 kg) 2 ml /kg/h for second 10kg of body weight (20 ml/h for 2nd 10kg = 60 ml/h for 20kg child) 1 ml /kg/h for each kg over 20kg (example - 40 kg child = 60 ml/h plus 20 ml/h = 80 ml/h) </td> </tr> </table> <p>NOTE: Clinical (urine output) and laboratory (hematocrit, serum specific gravity) assessments and electrolyte correction are key components of fluid therapy and are not specifically addressed by these recommendations. NOTE: For further information and examples, see Rehydration Project: http://rehydrate.org/</p>	Utilize appropriate oral rehydration solution	Oral rehydration solution: 1 liter water (5 cups) + 1 tsp salt + 8 tsp sugar, add flavor (e.g., ½ cup orange juice, other) as needed. Rehydration for moderate dehydration 50-100mL/kg over 2-4 hours	Pediatric hydration	Pediatric maintenance fluids: <ul style="list-style-type: none"> 4 ml /kg/h for first 10kg of body weight (40 ml/h for 1st 10 kg) 2 ml /kg/h for second 10kg of body weight (20 ml/h for 2nd 10kg = 60 ml/h for 20kg child) 1 ml /kg/h for each kg over 20kg (example - 40 kg child = 60 ml/h plus 20 ml/h = 80 ml/h) 	<i>Substitute</i>			
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Provide Nasogastric Hydration Instead of IV Hydration When Practical <ul style="list-style-type: none"> Patients with impediments to oral hydration may be successfully hydrated and maintained with nasogastric (NG) tubes. For fluid support, 8-12F (pediatric: infant 3.5F, < 2yrs 5F) tubes are better tolerated than standard size tubes. 	<i>Substitute</i>							
Substitute Epinephrine for Other Vasopressor Agents <p>For hemodynamically unstable patients who are adequately volume-resuscitated, consider adding 6mg epinephrine (6ml of 1:1000) to 1000ml NS on minidrip tubing and titrate to target blood pressure.</p> <ul style="list-style-type: none"> Epinephrine 1:1000 (1mg/ml) multi-dose vials available for drip use. 	<i>Substitute</i>							
Re-use CVP, NG, and Other Supplies After Appropriate Sterilization/Disinfection <ul style="list-style-type: none"> Cleaning for all devices should precede high-level disinfection or sterilization. High-level disinfection for at least twenty minutes for devices in contact with body surfaces (including mucous membranes); glutaraldehyde, hydrogen peroxide 6%, or bleach (5.25%) diluted 1:20 (2500 ppm) are acceptable solutions. NOTE: chlorine levels reduced if stored in polyethylene containers - double the bleach concentration to compensate) . Sterilize devices in contact with bloodstream (e.g., ethylene oxide sterilization for CVP catheters). 	<i>Re-use</i>		(disinfection - NG, etc)	(sterilization - central line, etc)				

HEMODYNAMIC SUPPORT AND IV FLUIDS

STRATEGIES FOR SCARCE RESOURCE SITUATIONS (cont.)

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis
<p>Intraosseous/Subcutaneous (Hypodermoclysis) Replacement Fluids</p> <ul style="list-style-type: none"> Consider as an option when alternative routes of fluid administration are impossible /unavailable. Intraosseous route preferred over subcutaneous. <p><u>Intraosseous</u></p> <ul style="list-style-type: none"> Intraosseous infusion is not generally recommended for hydration purposes but may be used until alternative routes are available. Intraosseous infusion requires pump or pressure bag. Rate of fluid delivery is often limited by pain of pressure within the marrow cavity. This may be reduced by pre-medication with lidocaine 0.5 mg /kg slow IV push. <p><u>Hypodermoclysis</u></p> <p>Cannot correct more than moderate dehydration via this technique. Many medications cannot be administered subcutaneously.</p> <p>Common infusion sites: pectoral chest, abdomen, thighs, upper arms.</p> <p>Common fluids: normal saline (NS), D5NS, D5 1/ 2 NS (Can add up to 20-40 mEq potassium if needed.)</p> <p>Insert 21/24 gauge needle into subcutaneous tissue at a 45 degree angle, adjust drip rate to 1-2 ml per minute. (May use 2 sites simultaneously if needed.)</p> <p>Maximal volume about 3 liters / day; requires site rotation.</p> <p>Local swelling can be reduced with massage to area.</p> <p>Hyaluronidase 150 units / liter facilitates fluid absorption but not required; may not decrease occurrence of local edema</p>	<i>Substitute</i>			
<p>Consider Use of Veterinary and Other Alternative Sources for Intravenous Fluids and Administration Sets</p>	<i>Adapt</i>			

